

CLAIMS

What is claimed:

1. An in-ground method for lifting a structure, said structure having a foundation, said
5 foundation being supported by soil, said method comprising:

forming a plurality of spaced excavations underneath said foundation;

mounting at least one form in each of said plurality of excavations;
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pouring hardenable material into said forms in said plurality of excavations to thereby
form a plurality of piston assemblies within said excavations, each piston assembly
comprising at least one piston and at least one cylinder moveable with respect to each other,
said hardenable material affixing at least one or said at least one piston or said at least one
15 cylinder with respect to said soil; and

pumping fluid into said plurality of piston assemblies to lift said structure and said
foundation with respect to said soil.

20 2. The method of claim 1, wherein said excavations are formed with a hydro-excavator.

3. The method of claim 1, wherein said fluid pumped may comprise hardenable material.
- 5 4. The method of claim 1, further comprising permanently affixing said at least one piston in position with respect to said at least one cylinder for said plurality of piston assemblies within a range whereby a height of said foundation is adjustable within a range of movement after said structure is lifted.
- 10 5. The method of claim 4, further comprising partially filling a piston cylinder cavity with hardenable material.
6. The method of claim 5, further comprising filling a portion of said piston cylinder cavity with particles that can be removed from or added to said piston cylinder at a time after lifting.
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7. The method of claim 1, further comprising monitoring a plurality of sensors while lifting said structure to minimize stresses on said foundation.
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8. An in-ground system for lifting a structure, said structure having a foundation, said foundation being supported by soil, said system comprising:

a plurality of piston assemblies, said plurality of piston assemblies being positioned within excavations beneath said structure;

5 at least one piston cylinder for each of said plurality of piston assemblies, said at least one piston cylinder being formed from hardenable material that is poured into said excavation;

at least one piston for each of said plurality of piston assemblies, said at least one piston being formed from hardenable material that is poured into said excavation, said at least one piston being formed internally of said at least one piston cylinder;

at least one fluid line for pumping fluid for each of said plurality of piston assemblies.

9. The system of claim 2, further comprising:

at least one sleeve for each of said plurality of piston assemblies, said sleeve being mounted within said excavation whereby hardenable material may be poured outside said at least one sleeve to form said at least one piston cylinder, and hardenable material may inside said sleeve to form said at least one piston.

10. An in-ground method for lifting a structure, said structure having a foundation, said foundation being supported by soil, said method comprising:

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positioning a plurality of piston assemblies beneath said structure, each piston assembly having a length sufficient to lift said structure more than three feet; and

5 operating said plurality of piston assemblies simultaneously to lift said foundation and said structure more than three feet with respect to said soil.

11. The method of claim 1, wherein the form is a sleeve.

10 12. The method of claim 11, wherein seals are inserted into the sleeve.

13. An in-ground piston assembly for lifting a structure, said structure having a foundation, said foundation being supported by soil, an excavation being formed beneath said structure, said in-ground piston assembly comprising:

15 a first sleeve mounted within said excavation beneath said structure;

 an impermeable membrane initially positioned within said first sleeve prior to operation of said in-ground piston assembly;

 a piston being comprised of hardenable material, said impermeable membrane preventing contact between an internal surface of said first sleeve and said hardenable material of said piston as said hardenable material hardens; and

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a cylinder formed outside said sleeve, said cylinder being comprised of hardenable material poured outside said sleeve.

14. The in-ground piston assembly of claim 13, further comprising a second sleeve, said
5 cylinder being positioned between said first sleeve and said second sleeve.

15. The in-ground piston assembly of claim 13, further comprising seals within said cylinder to provide a sealed pressure chamber within said cylinder whereby sufficient pressure within said pressure chamber produced sufficient force to move said piston with
10 respect to said cylinder.

16. The in-ground piston assembly of claim 15, further comprising a hydraulic line to said pressure chamber.

15 17. The in-ground piston assembly of claim 15, further comprising a hardenable hydraulic fluid pumpable into said chamber which hardens after usage to maintain said piston in an extended position with respect to said cylinder.